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Effect Of Target Shape On Dynamic Remote Gravitational Force And Gravitational Time Dilation

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Abstract
Recently Giorgio Toro did an experiment on a pendulum clock made of different metals and had found that the fixed mass pendulums at 90º to the swing plane had slower clock rates than those parallel to the swing plane. These results can be explained nicely by vertical dynamic gravitational force and Wu's Spacetime Shrinkage Theory. Because of the large projection cross area of the fixed mass pendulum at 90º to the swing plane, the vertical dynamic remote gravitational force is larger. Therefore, the total graviton bombardment is bigger such that the clock rate is slower (Gravitational Time Dilation) based on Wu's Spacetime Shrinkage Theory. This experiment also gives an indirect proof to the existence of static and dynamic graviton fluxes based on Yangton and Yington Theory.

Keywords: *Graviton, Graviton Force, Graviton Radiation, Graviton Flux, Static Graviton Flux, Dynamic Graviton Flux, Remote Gravitational Force, Effective Graviton Flux, Effective Remote Gravitational Force. Yangton and Yington, Wu's Pairs, Pendulum Clock.*

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I. Background

Recently Giorgio Toro did an experiment on a pendulum clock made of different metals and had found that the pendulums at 90º to the swing plane had slower clock rates than those parallel to the swing plane [1]. It is proposed that aether has increased the inertia of the pendulum so as to slow down the clock rates. However, since aether doesn't exist, therefore in this paper, vertical dynamic graviton flux [2], effective remote gravitational force [2] and target's shape effects are brought up for a potential explanation.

II. Graviton and Gravitational Force

Based on Yangton and Yington Theory [3], Wu's Pairs are the Building Blocks of the universe. When two Wu's Pairs come together with the same circulation direction (either spin up or spin down), they can stack up on each other at a locked-in position, where Yangton of the first Wu's Pair lines up to the Yington of the second one due to the attractive force between Yangton and Yington particles from each Wu's Pairs. This attractive force is called "String Force". By repeating this stacking process, various linear structures can be formed such as single string, multiple strings and ball type strings, etc. The single string structure is named "Graviton" [4].

When two gravitons come together side by side, no matter the circulation directions, they can adjust themselves so as to attract each other at the contact points by a group of string forces generated between the Yangtons of one graviton and the Yingtons of the other graviton in each cycle of circulations. This process is called "Contact Interaction" and the group of attraction only string forces generated between the two adjacent gravitons in the same object is named "Gravitational Force" [4]. Other elementary subatomic particles having basic string structures such as quarks, leptons and bosons can also have gravitational forces between them, except photon and gluons which don't have string structures or adjustable circulations.

III. Graviton Radiation and Contact Interaction – Remote Gravitational Force

Like photon, graviton can also be radiated from a parent object by absorbing thermal or kinetic energy. This process is called "Graviton Radiation". As a graviton emitted from the parent object reaches the target object, it makes a contact side by side with the graviton on the target object where the two gravitons can adjust themselves so as to attract each other at the contact points by a group of string forces generated between the Yangtons of one graviton and the Yingtons of the other graviton in each cycle of circulations. This interaction is called "Contact Interaction" and this group of string forces generated between two gravitons from different objects is called "Remote Gravitational Force". Also, the entire process is called "Graviton Radiation and Contact Interaction Theory" [5]. In general, Remote Gravitational Force contains "a group of gravitational forces" generated by the contact interactions between two groups of gravitons, one group from target object and the other group through graviton flux from parent object. It is different from an ordinary gravitational force

which is "a single gravitational force" generated by the contact interaction between two adjacent gravitons on the same object. In addition, Remote Gravitational Force applied on target object is always toward to the opposite direction of the graviton flux from parent object.

As a result, instead of being produced by the propagation of gravitational force generated from parent object, Universal Gravitation as the remote gravitational force is generated by Graviton Radiation and Contact Interaction process between two objects. In fact, gravitational force cannot propagate by itself, only gravitons can move through graviton radiation, and such that Remote Gravitational Force is produced.

IV. Static Graviton Flux and Dynamic Graviton Flux

Graviton flux is generated by graviton radiation, it is the graviton streams emitted from parent object to target object. There are two types of graviton fluxes: Static Graviton Flux and Dynamic Graviton Flux (Fig. 1) (revised from [2][6][7]).

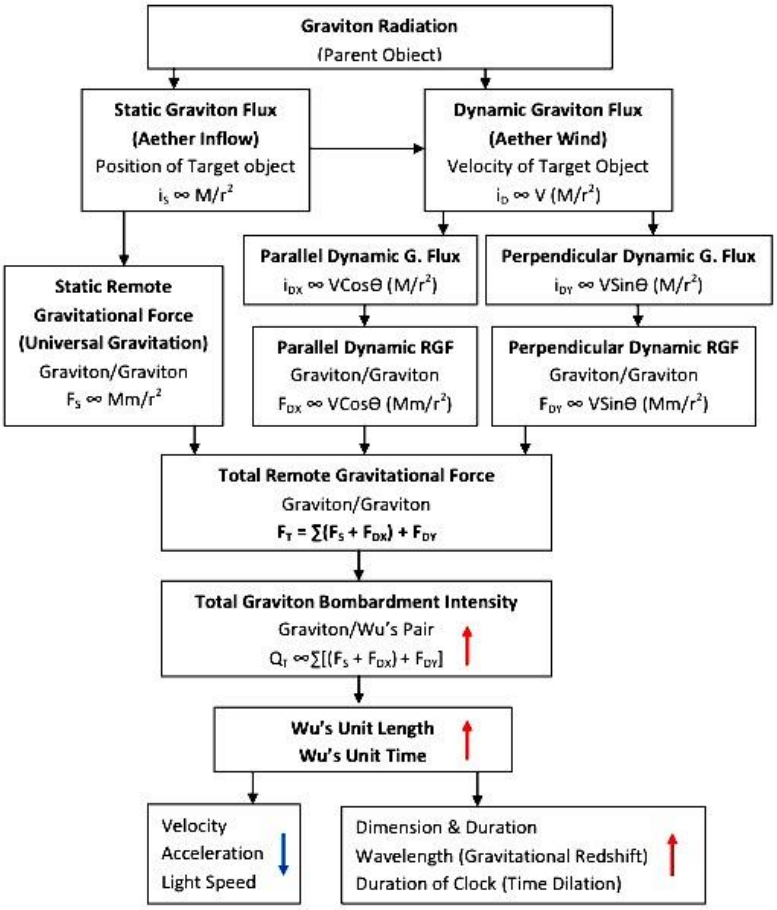

Fig. 1 The correlations between Static Graviton Flux and Dynamic Graviton Flux, and between Graviton Bombardment and Properties of Objects and Events.

Static Graviton Flux (also known as Aether Inflow) is the graviton flux moving from parent object to stationary target object at a straight path observed at the target object with intensity dependent on the distance between parent object and target object. Dynamic Graviton Flux (also known as Aether Wind) on the other hand is the graviton flux moving at the same speed but opposite direction to that of target object observed at the target object with intensity dependent on both the velocity of target object and the intensity of Static Graviton Flux. Dynamic Graviton Flux can only be produced by moving target object.

As a result, the total Remote Gravitational Force is the force generated by the contact interactions between the gravitons from parent object and that on target object through both Static Graviton Flux and Dynamic Graviton Flux.

Because all the properties of an object or event are dependent on Wu's Unit Length and Wu's Unit Time of the subatomic particles in the object or even, therefore they are dependent on the total graviton

bombardment to Wu's Pairs in target object, as is the total intensity of remote gravitational force, or the total intensity of Static Graviton Flux and Dynamic Graviton Flux on target object.

V. Newton's Law of Universal Gravitation

According to Particle Radiation and Contact Interaction Theory, Newton's Law of Universal Gravitation [8] can be derived and used to calculate the Static Remote Gravitational Force (Universal Gravitation) caused by Static Graviton Flux between two objects.

Like photon emitted from a heat source by absorbing thermal energy to overcome the string force, graviton can also be emitted from an object by absorbing thermal energy to overcome the gravitational force. As both parent object and target object are stationary, it is obvious that Static Graviton Flux (i_s), the gravitons emitted from parent object to target object per unit area per unit time, should be proportional to the mass of the parent object (m_1), and also inversely proportional to the square of the distance (r) between parent object and target object (Fig. 2). Therefore,

$i_s = p\, m_1/r^2$

$\mathbf{i_s} = p\, m_1/r^2\, \mathbf{r}$

Where $\mathbf{i_s}$ is the static graviton flux vector, i_s is the static graviton flux, p is static graviton flux constant, m_1 is the mass of parent object, r is the distance from m_1 and **r** is the unit vector with direction away from m_1.

Furthermore, the static remote gravitational force (F_s) generated by contact interaction between the gravitons emitted from the parent object and the gravitons on the target object should be proportional to the static graviton flux (i_s) in compliance with Graviton Radiation, and the total quantity of the gravitons on the target object that is proportional to the mass of the target object (m_2) in accordance to Contact Interaction (Fig. 2). Therefore,

$F_s = q(p\, m_1/r^2)\, m_2$

$\mathbf{F_s} = q(p\, m_1/r^2)\, m_2\, \mathbf{S}$

Where $\mathbf{F_s}$ is the static remote gravitational force vector, F_s is the static remote gravitational force, q is graviton contact interaction constant, p is static graviton flux constant, m_1 is the mass of parent object and m_2 is the mass of target object, r is the distance between m_1 and m_2 and **S** is the unit vector with direction from m_2 to m_1.

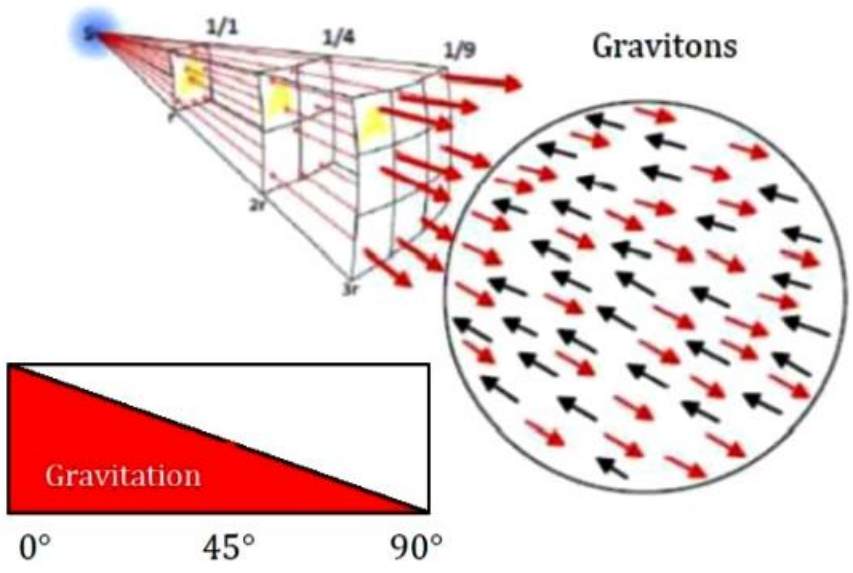

Fig. 2 Gravitational force caused by Graviton Radiation and Contact Interaction.

In addition, because of the random angels from 0° to 90° between the emitted gravitons from the parent object and the gravitons on the target (Fig. 2) [5], an average 50% of the full contact interactions should be expected.

Furthermore, given G = pq, then Newton's Law of Universal Gravitation (Fig. 3) which is the same as static remote gravitational force can be represented as follows:

$\mathbf{F} = G (m_1 m_2/r^2) \mathbf{S}$

Where **F** is universal gravitation vector (static remote gravitational force vector), G is gravitational constant (static gravitational constant) 6.674×10^{11} N m^2 kg^{-2}, m_1 is the mass of parent object and m_2 is the mass of target object, r is the distance between m_1 and m_2 and **S** is the unit vector with direction from m_2 to m_1.

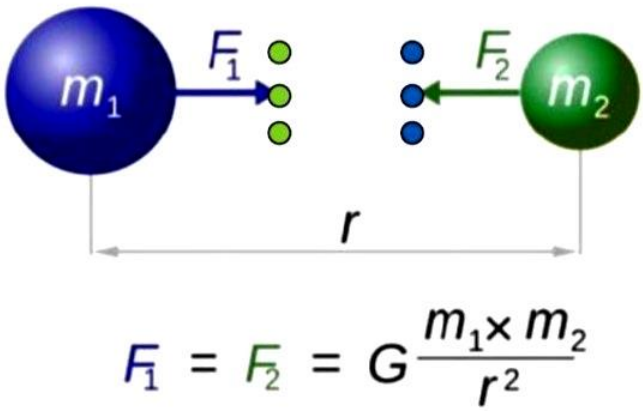

Fig. 3 Remote gravitational force between two objects.

VI. Graviton Bombardment

According to Wu's Spacetime Shrinkage Theory [9], Wu's Unit Length and Wu's Unit Time of Wu's Pairs (building blocks of the universe) can be affected by particle bombardment, especially the graviton bombardment which results in the attraction caused by the remote gravitational force (here bombard means contact interaction rather than impaction) as indicated in Fig. 1. Since all the properties of the object or event are dependent on Wu's Unit Length and Wu's Unit Time of Wu's Pairs in the subatomic particles of the object or event, therefore, the dimension, duration, velocity and acceleration of an object or event, as well as wavelength, light speed and time dilation can all be affected by the graviton bombardment resulting from static graviton flux (Aether Inflow) [2] and dynamic graviton flux (Aether Wind) [2] generated by graviton radiations from all the objects in the universe. Furthermore, because Wu's Pairs are randomly oriented in the target object, all the properties of an object or event are dependent on the intensity of graviton bombardment.

Under both thermal equilibrium at a constant temperature and pressure, and subatomic equilibrium at a constant gravitational field (constant graviton bombardment) and aging of the universe, all Wu's Pairs in the subatomic particles of an object or event have fixed Wu's Unit Length and Wu's Unit Time, as is all the properties of an object or event. This is known as Principle of Equilibrium [10]. In addition, according to Wu's Spacetime Shrinkage Theory [9], an object or event at a massive graviton bombardment (or at a large gravitational field) or in an early stage aging of the universe should have a larger Wu's Unit Length and Wu's Unit Time, a bigger dimension and duration, also a larger wave length, smaller light speed and slower time clock than that at a smaller graviton bombardment or in a later stage aging of the universe. These correlations can be used successfully in the interpretation of many cosmological phenomena such as Gravitational Redshift, Deflection of Light, Perihelion Precession of Mercury and Time Dilation, etc.

VII. Gravitational Field, Graviton Flux and Graviton Bombardment

Static graviton flux and static remote gravitational force of a single parent object can be represented as follows:

$\mathbf{i_s} = p\, m_1/r^2\, \mathbf{r}$

$\mathbf{F}_s = q\, m_2(p\, m_1/r^2\, \mathbf{S})$

Where $\mathbf{i_s}$ is static graviton flux vector, $\mathbf{F}_s$ is static remote gravitational force vector (universal gravitation vector), p is static graviton flux constant, q is graviton contact interaction constant, m_1 is the mass of parent object, m_2 is the mass of target object, r is the distance between m_1 and m_2, **r** is the unit vector from m_1 to m_2 and **S** is the negative unit vector of **r**.

However, gravitational field is defined as the total remote gravitational force generated by all the parent objects in the universe on a unit mass ($1K_g$) at a point in space. Therefore, in a stationary system (no dynamic graviton flux) the gravitational field in a multiple parent object system can be represented as follows:

$\mathbf{F_g} = 1K_g \sum G\,(M/r^2)\,\mathbf{S}$

Where $\mathbf{F_g}$ is the gravitational field, G is gravitational constant 6.674×10^{11} N m^2 kg^{-2}, M is the mass of each parent object, r is the distance from each parent object to the unit mass and **S** is the unit vector from the unit mass to each parent object.

In addition, the total graviton bombardment intensity Q_T is equal to the summation of static graviton bombardment intensity Q_s (same as static remote gravitational force) and dynamic graviton bombardment intensity Q_d (same as dynamic remote gravitational force).

$Q_T = Q_s + Q_d$

$Q_T = qm(\sum i_s + \sum i_d)$

In a stationary system, since there is no dynamic graviton flux ($\sum i_d = 0$), therefore, the total graviton bombardment intensity at target object is equal to the total static graviton bombardment intensity, as is the total static remote gravitational force at target object.

$Q_T = q\ m\sum p(M/r^2) = \sum(GMm/r^2)$

Where Q_T is total graviton bombardment intensity, p is static graviton flux constant, q is graviton contact interaction constant, m is the mass of target object, M is the mass of each parent object and r is the distance between the point and each parent object.

As a result, in the system of a stationary single parent object, or that of a large parent object, the intensity of graviton bombardment on a unit mass is equal to the intensity of gravitational field.

(Note: The concentration of graviton vectors mentioned in my previous publications [5][11] is incorrect and should be replaced by graviton flux and intensity of graviton bombardment [12]).

VIII. Dynamic Graviton Flux and Dynamic Remote Gravitational Force

Static Graviton Flux can be generated from any parent object to target object. However, Dynamic Graviton Flux can only be produced from parent object to moving target object. Fig. 4 shows a schematic diagram of Dynamic Graviton Flux [7](revised from [2]).

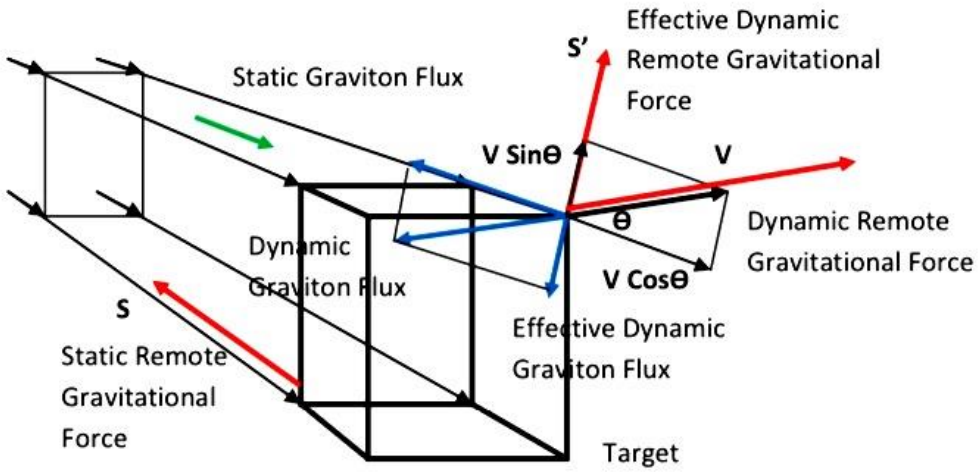

Fig. 4 Correlations between static graviton flux, static remote gravitational force, target object moving velocity, dynamic graviton flux, dynamic remote gravitational force, effective dynamic graviton flux and effective dynamic remote gravitational force.

Like any flux, graviton flux should be proportional to the speed of graviton flux V_g,

$i = kV_g\,(m_1/r^2)$

Therefore, static graviton flux and dynamic graviton flux generated from a parent object m_1 can be represented as follows:

$i_s = kC\,(m_1/r^2)$

$i_d = kV\,(m_1/r^2)$

Also,

$p = k\,C$

Therefore,

$i_s = p\ (m_1/r^2)$

$i_d = (V/C)\ p\ (m_1/r^2)$

Where i_s is static graviton flux and i_d is dynamic graviton flux. k is graviton flux constant, p is static graviton flux constant, C is static graviton flux speed (assuming Absolute Light Speed), V is the speed of dynamic flux (same as the speed of target object but in the opposite direction), m_1 is the mass of parent object and r is the distance between parent object and target object.

Dynamic graviton flux is a vector with the same speed but opposite direction as that of target object. Also, dynamic graviton flux has two components: One component is parallel to the static graviton flux (i_{dx}) with a speed of VCosΘ (where V is the speed of the moving target object and Θ is the angle between static graviton flux and target object moving direction), and the other one is perpendicular to the static graviton flux (i_{dy}) with a speed of VSinΘ (Fig. 4). Since V is much smaller than static graviton flux speed (assuming Absolute Light Speed C), therefore the parallel component along static graviton flux (i_{dx}) is negligible and only the perpendicular component (i_{dy}) named Vertical dynamic Graviton Flux [2] should be considered.

Because

$i_d = (V/C)\ p\ (m_1/r^2)$

$i_{dy} = (V\text{Sin}\Theta/C)\ p(m_1/r^2)$

$i_{dx} = (V\text{Cos}\Theta/C)\ p(m_1/r^2)$

Also,

$G = pq$

Therefore,

$F_{dy} = (V\text{Sin}\Theta/C)\ G\ (m_1m_2/r^2)$

$F_{dx} = (V\text{Cos}\Theta/C)\ G\ (m_1m_2/r^2)$

$\mathbf{F_{dy}} = (V\text{Sin}\Theta/C)\ G\ (m_1m_2/r^2)\ \mathbf{S'}$

$\mathbf{F_{dx}} = (V\text{Cos}\Theta/C)\ G\ (m_1m_2/r^2)\ \mathbf{S}$

Where F_{dy} is vertical dynamic remote gravitational force and $\mathbf{F_{dy}}$ is vertical dynamic remote gravitational force vector [7](revised from [2][6]), F_{dx} is parallel dynamic remote gravitational force and $\mathbf{F_{dx}}$ is parallel dynamic remote gravitational force vector, G is static gravitational constant, V is the speed of target object m_2, Θ is the angle between static graviton flux and target object moving direction, **S** is the unit vector in the direction of static remote gravitational force and **S'** is the unit vector of dynamic remote gravitational force which is in the perpendicular direction of static graviton flux at the same side as the moving target object to static graviton flux.

As a result, the total remote gravitational force $\mathbf{F_T}$ is a vector summation of static remote gravitational force $\mathbf{F_s}$, parallel dynamic remote gravitational force $\mathbf{F_{dx}}$ and vertical dynamic remote gravitational force $\mathbf{F_{dy}}$.

$\mathbf{F_T = F_s + F_{dx} + F_{dy}}$

$\mathbf{F_s} = G\ (m_1m_2/r^2)\ \mathbf{S}$

$\mathbf{F_{dx}} = (V\text{Cos}\Theta/C)\ G(m_1m_2/r^2)\ \mathbf{S}$

$\mathbf{F_{dy}} = (V\text{Sin}\Theta/C)\ G(m_1m_2/r^2)\ \mathbf{S'}$

In addition, gravitational field is defined as the total remote gravitational force generated by parent objects on a unit mass ($1K_g$) at a point in space. Therefore, for dynamic single parent object system (with moving target object), the gravitational field can be represented as follows [7]:

$\mathbf{F_g} = 1K_g\ G[(1+ V\text{Cos}\Theta/C)\ (M/r^2)\ \mathbf{S} + V\text{Sin}\Theta/C\ (M/r^2)\ \mathbf{S'}]$

Furthermore, for a multiple parent objects system, the total graviton bombardment intensity Q on 1 K_g at a fixed point in space (reference point) is equal to the total intensities of remote gravitational forces, which is the summation of the total intensities of static remote gravitational forces from all parent objects and the total intensities of dynamic remote gravitational forces from all the moving parent objects [7].

$Q = 1\ K_g\ q\ (\sum i_s + \sum i_d)$

$Q = 1\ K_g\ (\sum G(M/r^2) + \sum GV/C\ (M/r^2))$

The total graviton bombardment intensity determines Wu's Unit Length and Wu's Unit Time of Wu's Pairs, as well as the wavelength, clock duration and all the properties of an object or event.

IX. Effect of Target Shape on Dynamic Remote Gravitational Force

Static and dynamic remote gravitational forces generated by contact interaction between two gravitons, one in the graviton flux from parent object and the other one on target object, are dependent on the shape of the target object which reflects the possibility of contact interactions. Therefore, a possibility factor R should be incorporated into the formula of remote gravitational force as follows:

Because

$i = kV_g\ (m_1/r^2)$

Therefore,

$F = R\ qm_2\ i$

$F = R\, qm_2\, (kV_g\, (m_1/r^2))$

Where k and q are constants, V_g is the speed of graviton flux (V_g = C the Absolute Light Speed in static graviton flux and V_g = V the speed of target object in dynamic graviton flux), m_1 is the mass of parent object, m_2 is the mass of target object, r is the distance between two objects, Shape Factor R reflecting the possibility of contact interactions which is dependent on the shape and orientation of the target object. For examples, R is proportional to the projection cross area of a fixed mass target object. Also, R is equal to a constant for a spherical target object at far distance.

Recently Giorgio Toro did an experiment on a pendulum clock made of different metals and had found out that the fixed mass pendulums at 90° to the swing plane had slower clock rates than those parallel to the swing plane [1]. These results can be explained nicely by vertical dynamic remote gravitational force and Wu's Spacetime Shrinkage Theory as follows:

Because

$i_{dy} = (V\mathrm{Sin}\Theta/C)\, p(m_1/r^2)$

$F = R\, qm_2\, i_{dy}$

$P = kC$

$G = pq$

Therefore,

$F_{dy} = R\, (V\mathrm{Sin}90^o/C)\, G\, (m_1m_2/r^2)$

$\mathbf{F_{dy}} = R\, (V\mathrm{Sin}90^o/C)\, G\, (m_1m_2/r^2)$ **S'**

Where V is the speed of the target object, C is Absolute Light Speed, R is the shape factor of target object, which is proportional to the projection cross area of a fixed mass target object. **S'** is the unit vector of dynamic remote gravitational force which is in the perpendicular direction of static graviton flux at the same side as the moving target object to static graviton flux.

Because of the large projection cross area, the fixed mass pendulums at 90° to the swing plane (Fig. 5) have a bigger shape factor R, such that the vertical dynamic remote gravitational force is larger, as is the total graviton bombardment. In addition, according to Wu's Spacetime shrinkage Theory, under large graviton bombardment (or gravitational field), Wu's Unit Time is bigger, clock's period is bigger and clock rate is slower (Gravitational Time Dilation). This explains very well Giorgio Toro's experiments which have nothing to do with the inertia caused by aether. Furthermore, this experiment gives an indirect proof to the existence of static and dynamic graviton fluxes based on Yangton and Yington Theory.

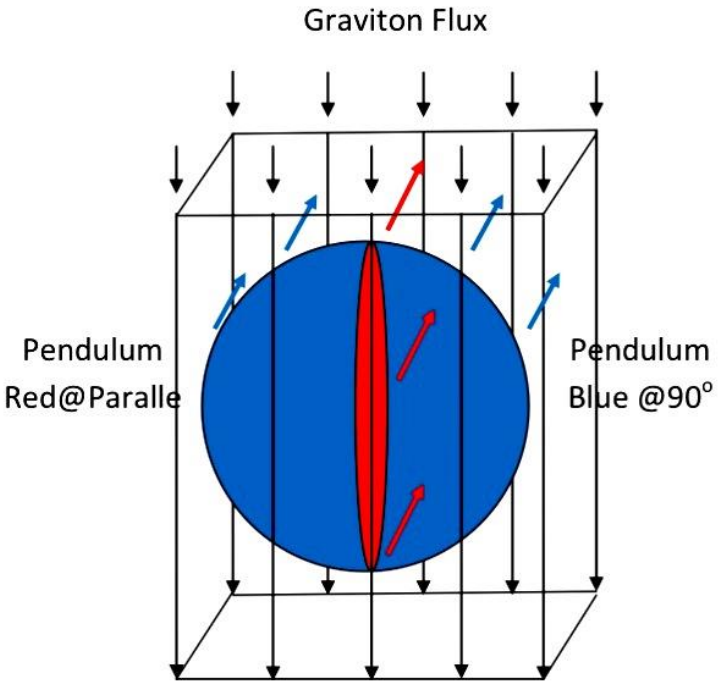

Fig. 5 Dynamic graviton fluxes and dynamic remote gravitational forces generated by pendulum @ parallel and @ 90° to the swing plane.

X. Conclusion

Recently Giorgio Toro did an experiment on a pendulum clock made of different metals and had found that the fixed mass pendulums at 90^o to the swing plane had slower clock rates than those parallel to the swing plane. These results can be explained nicely by vertical dynamic gravitational force and Wu's Spacetime Shrinkage Theory. Because of the large projection cross area of the fixed mass pendulum at 90^o to the swing plane, the vertical dynamic remote gravitational force is larger. Therefore, the total graviton bombardment is bigger such that the clock rate is slower (Gravitational Time Dilation) based on Wu's Spacetime Shrinkage Theory. This experiment also gives an indirect proof to the existence of static and dynamic graviton fluxes based on Yangton and Yington Theory.

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